We claim:

1. A coated multilayer structure comprising:

a polymeric base layer;

a zero valent material barrier layer; and

a top coat on the zero valent material barrier layer, the top coat comprising a soluble compound capable of reducing the permeability of the multilayer structure to gas or vapor.

2. A coated multilayer structure as in claim 1 wherein the zero valent material barrier layer is a barrier to transmission of ultraviolet light.

3. A coated multilayer structure as in claim 1 wherein the zero valent material barrier layer is a metal coating.

4. A coated multilayer structure as in claim 1 wherein the zero valent material barrier layer is a silicon, aluminum, nickel, chromium or copper coating.

5. A coated multilayer structure as in claim 1 wherein the zero valent material barrier layer is a silicon coating.

6. A coated multilayer structure as in claim 1 wherein the zero valent material barrier layer is an aluminum coating.

7. A coated multilayer structure as in claim 1 wherein the multilayer structure has an ultraviolet light transmission of less than 5 % at 380 nm wavelength.

8. A coated multilayer structure as in claim 1 wherein the soluble compound has a carboxyl, hydroxyl, or carboxamide functional group.

9. A coated multilayer structure as in claim 1 wherein the soluble compound is in a solid state at a temperature of 25 C and atmospheric pressure.

10. A coated multilayer structure as in claim 1 wherein the soluble compound is nonreactive with the zero valent material barrier layer.

11. A coated multilayer structure as in claim 1 wherein the soluble compound is nontoxic.

12. A coated multilayer structure as in claim 1 wherein the soluble compound is polymeric.

13. A coated multilayer structure as in claim 6 wherein the polymeric soluble compound is selected from the group consisting of carboxymethyl cellulose, poly(acrylamide), polydextrose, poly(acrylic acid), and poly(vinyl alcohol).

14. A coated multilayer structure as in claim 1 wherein the soluble compound is monomeric.

15. A coated multilayer structure as in claim 14 wherein the monomeric soluble compound is selected from the group consisting of sucrose, caramel, and citric acid.

16. A coated multilayer structure as in claim 1 wherein soluble compound is water soluble and is applied to the zero valent material barrier layer in an aqueous solution.

17. A coated multilayer structure as in claim 16 wherein the soluble compound, when in the aqueous solution, is in the form of molecules having a maximum dimension less than one micron.

18. A coated multilayer structure as in claim 1 wherein the zero valent material barrier layer has pinholes and the top coat is at least partially disposed in the pinholes.

19. A coated multilayer structure as in claim 1 wherein the zero valent material barrier layer is applied to the base layer with vapor deposition or sputtering.

20. A coated multilayer structure as in claim 1 wherein the base layer is a thermoplastic layer.

21. A coated multilayer structure as in claim 1 wherein the base layer is polyethylene terephthalate.

22. A coated multilayer structure as in claim 1 wherein the multilayer structure is a container.

23. A coated multilayer structure as in claim 22 wherein the base layer forms a container body and the zero valent material barrier layer is on an exterior surface of the container body.

24. A packaged beverage comprising a container as in claim 22 and a beverage disposed in the container.

25. A packaged beverage as in claim 24 wherein the beverage is a carbonated beverage.

26. A packaged beverage as in claim 24 wherein the beverage is beer.

27. A coated multilayer structure comprising:

a polymeric base layer; and

a zero valent material barrier layer, wherein the zero valent material barrier layer is a barrier to transmission of ultraviolet light.

28. A coated multilayer structure as in claim 27 wherein the zero valent material barrier layer is a silicon coating.

29. A coated multilayer structure as in claim 27 wherein the multilayer structure has an ultraviolet light transmission of less than 5 %.

30. A coated multilayer structure as in claim 27 wherein the zero valent material barrier layer is applied to the base layer with vapor deposition or sputtering.

31. A coated multilayer structure as in claim 27 wherein the base layer is a thermoplastic layer.

32. A coated multilayer structure as in claim 27 wherein the base layer is polyethylene terephthalate.

33. A coated multilayer structure as in claim 27 wherein the multilayer structure is a container.

34. A coated multilayer structure as in claim 33 wherein the base layer forms a container body and the zero valent material barrier layer is on an exterior surface of the container body.

35. A coated multilayer structure as in claim 27 further comprising an inorganic oxide gas barrier layer.

36. A coated multilayer structure as in claim 35 further comprising a top coat comprising a soluble compound capable of reducing the permeability of the multilayer structure to gas or vapor.

37. A coated multilayer structure as in claim 35 wherein the zero valent material barrier layer is a silicon coating.

38. A coated multilayer structure as in claim 37 wherein the inorganic oxide gas barrier layer is an SiOx coating.

39. A coated multilayer structure as in claim 38 further comprising a top coat comprising a soluble compound capable of reducing the permeability of the multilayer structure to gas or vapor.

40. A packaged beverage comprising a container as in claim 33 and a beverage disposed in the container.

41. A packaged beverage as in claim 40 wherein the beverage is a carbonated beverage.

42. A packaged beverage as in claim 40 wherein the beverage is beer.

43. A method for reducing the permeability of vapor or gas though a multilayer structure comprising a polymeric base layer and a zero valent material barrier layer on a surface of the polymeric base layer, the method comprising applying to the zero valent material barrier layer a top coat comprising a soluble compound capable of reducing the permeability of the multilayer structure to gas or vapor.

44. A method as in claim 43 wherein the zero valent material barrier layer is a barrier to transmission of ultraviolet light.

45. A method as in claim 43 wherein the zero valent material barrier layer is a metal coating.

46. A method as in claim 43 wherein the zero valent material barrier layer is a silicon, aluminum, nickel, chromium or copper coating.

47. A method as in claim 43 wherein the zero valent material barrier layer is a silicon coating.

48. A method as in claim 43 wherein the zero valent material barrier layer is an aluminum coating.

49. A method as in claim 43 wherein the multilayer structure has an ultraviolet light transmission of less than 5 %.

50. A method as in claim 43 wherein the soluble compound has a carboxyl, hydroxyl, or carboxamide functional group.

51. A method as in claim 43 wherein the soluble compound is in a solid state at a temperature of 25 degrees C and atmospheric pressure.

52. A method as in claim 43 wherein the soluble compound is nonreactive with the zero valent material barrier layer.

53. A method as in claim 43 wherein the soluble compound is nontoxic.

54. A method as in claim 43 wherein the soluble compound is polymeric.

55. A method as in claim 54 wherein the polymeric soluble compound is selected from the group consisting of carboxymethyl cellulose, poly(acrylamide), polydextrose, poly(acrylic acid), and poly(vinyl alcohol).

56. A method as in claim 43 wherein the soluble compound is monomeric.

57. A method as in claim 56 wherein the monomeric soluble compound is selected from the group consisting of sucrose, caramel, and citric acid.

58. A method as in claim 43 wherein the soluble compound is water soluble and the step of applying the soluble compound comprises applying the water soluble compound to the zero valent material barrier layer in an aqueous solution.

59. A method as in claim 58 wherein the soluble compound, when in the aqueous solution, is in the form of molecules having a maximum dimension less than one micron.

60. A method as in claim 43 wherein the zero valent material barrier layer has pinholes and the top coat is at least partially disposed in the pinholes.

61. A method as in claim 43 wherein the zero valent material barrier layer is applied to the base layer with vapor deposition or sputtering.

62. A method as in claim 43 wherein the base layer is a thermoplastic layer.

63. A method as in claim 43 wherein the base layer is polyethylene terephthalate.

64. A method as in claim 43 wherein the multilayer structure is a container.

65. A method as in claim 64 wherein the base layer forms a container body and the zero valent material barrier layer is applied to an exterior surface of the container body.

66. A method of packaging a beverage comprising:

providing a container comprising a polymeric container body and an zero valent material barrier layer on an exterior surface of the container body;

applying to the zero valent material barrier layer a top coat comprising a soluble compound capable of reducing the permeability of the container to gas or vapor; and

depositing a beverage in the container.

67. A method as in claim 66 wherein the beverage is a carbonated beverage.

68. A method for producing recycled content plastic comprising the steps of:

providing a batch plastic, at least a portion of the batch plastic comprising a coated multilayer structure comprising a polymeric base layer and a zero valent material barrier layer on a surface of the polymeric base layer, wherein the zero valent material barrier layer is a barrier to transmission of ultraviolet light;

chemically removing the zero valent material barrier layer; and

converting the batch plastic to a form suitable for melt extrusion.

69. A method as in claim 68 wherein the zero valent material barrier layer is a silicon coating.

70. A method as in claim 68 wherein the coated multilayer structure is a container.